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THE AGRICULTURAL STUDENT

A MONTHLY MAGAZINE DEVOTED TO AGRICULTURAL EDUCATION



JANUARY, 1910

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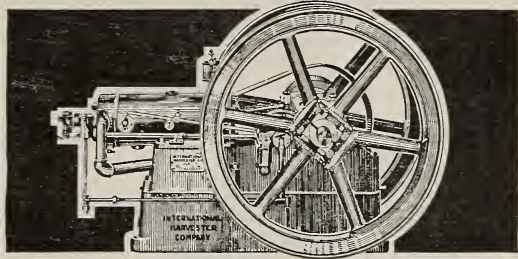
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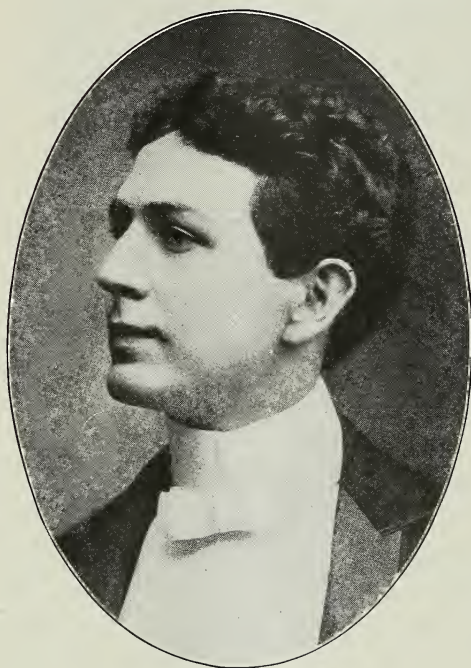
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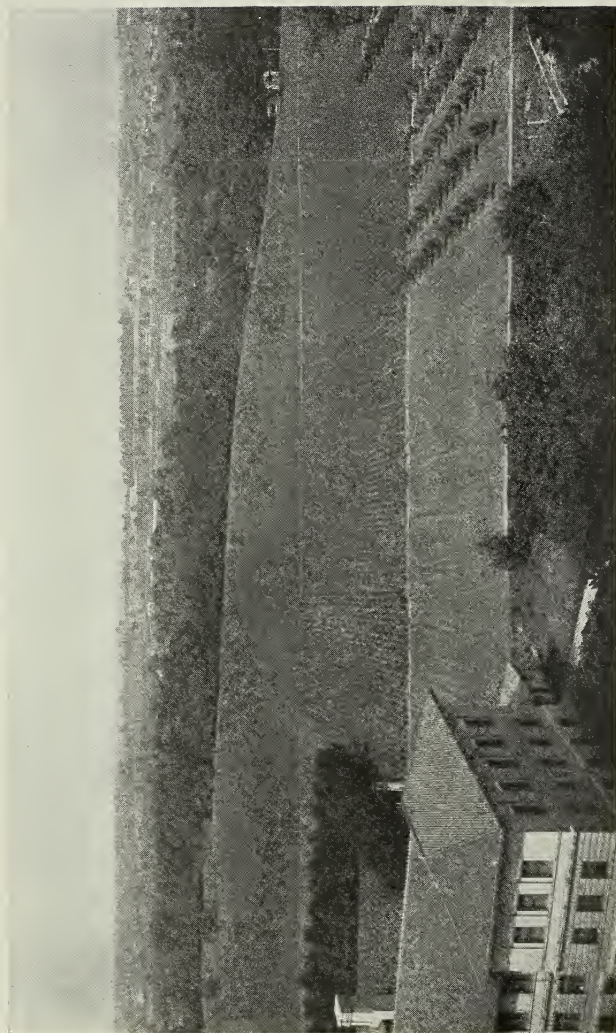
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Townshend Hall and Farm

THE AGRICULTURAL STUDENT

Vol. XVI. OHIO STATE UNIVERSITY, COLUMBUS, JANUARY, 1910 Number 4

Some Phases of the Protein Problem

By Dr. John F. Lyman

The word protein is derived from the Greek and signifies, "I am first or I take first place." All living organisms, plants as well as animals, are composed essentially of protein. The basis of every living cell is protoplasm, a substance closely allied to protein and usually distinguished from the latter by the fact that protoplasm is more complex and living, while protein is a dead substance. Protein, or its near relative, protoplasm, then is the basis of all the active tissues of our bodies, nerves, muscles, and glands, and as such is of the greatest interest.

Life has been defined by Spencer as, "the definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with external co-existence and sequences." Protoplasm, as the basis of life, is the substance of prime importance concerned in those changes which go to make up life as we know it, changes which are made possible by the extremely complex and unstable nature of the protoplasmic molecule.

The chemical composition of protoplasm is unknown, since we have no method at our disposal for investigating the composition of a living body. We know that protoplasm manifests the characteristics which make up what we call life. It grows, repairs waste, throws off undesirable substances, reproduces itself, and exhibits certain vital phenomena such as movement and

response to stimuli from without of various kinds. When protoplasm dies we know that the chief product formed is protein—a dead, inert substance, itself extremely complex in composition; but with whose chemical structure we are somewhat familiar.

Protein is composed of the elements carbon, oxygen, nitrogen, hydrogen, sulphur, and sometimes phosphorous or iron. In certain cases copper, iodine, chlorine, or bromine may be present. The nitrogen is the element most characteristic of the proteins, and is present, on an average, to the amount of about sixteen per cent., although this varies rather widely in the different proteins. The complexity of the molecule is exceedingly great, being by far the greatest of any chemical compound which has been studied. The difficulties in determining the exact molecular weight and the constitution of the molecule have so far baffled all investigators in the search for its exact structure. However, there are sufficient experimental data to justify the statement that the molecular weight of the different proteins probably lies somewhere between 5,000 and 16,000. Plainly, the determination of the exact structure of such a huge molecule and the synthesis of the same, present problems of untold difficulty.

The chemistry of the proteins has been studied in various ways by two general methods. First, by decompos-

ing the protein in some way as by boiling with alkalis or acids or by oxidizing with various agents and making a study of the decomposition products. Second, by attempting to synthesize proteins or compounds resembling proteins. So far not much has been accomplished by the second method, although, in view of the immensity of the problem at hand, great strides have been made toward the goal, namely, the knowledge of the composition of protein. Emil Fischer has been foremost in using this method of study and he has succeeded in synthesizing compounds, the so-called polypeptids, which give some of the protein reactions, but which, nevertheless, are far removed chemically from protein. By investigating the acid decomposition products of protein we have learned much as to the structure of the molecule. This method, especially in the hands of Fischer and Abderhalden in Germany and Osborne in this country, has been used extensively. It has been found that when proteins are boiled with mineral acids they may be decomposed into a large number of relatively simple compounds, the so-called mono- and diamino acids, phenyl and phenol derivatives, and heterocyclic compounds. So far this method has been the most fruitful in giving knowledge as to the structure of the protein molecule. It has shown, for instance, that animal and vegetable proteins differ markedly in their decomposition products, and further that many proteins are lacking in one or more of the characteristic decomposition products. For example, gelatine yields no tyrosine, cystine, or tryptophane, and zein, the prominent protein of corn, lacks certain tryptophane. It has been found that gelatine, when other proteins are not present in the diet, cannot support life. Zein, as the sole protein, is insuf-

ficient for rats. We may speculate on the cause of the disease pelagra which just at present seems to be gaining such headway, especially in the south among the class of people who live largely on a corn diet. It may be possible that this disease which has so far baffled the medical profession is caused by some such deficiency in the protein part of the diet. We now suppose that the protein molecule is made up of a large number of these mono- and diamino acids, phenyl and phenol derivatives and heterocyclic compounds and maybe some unknown substance joined together in a certain definite way.

With the advance of our knowledge of the composition of the proteins, our ideas of digestion in the animal body have changed notably. It was formerly supposed, and that not more than twenty or thirty years ago, that protein digestion was complete when decomposition had reached the proteose and peptone stage, since these substances were known to be soluble and diffusible and thought to be readily absorbed by the blood and utilized by the tissues. The first clue that protein digestion in the body advanced beyond the peptone stage was obtained by Kuehne, who found the amino acids leucine and tyrosine in pancreatic digestion mixtures. Further it was discovered that peptones or albuminoses when injected into the blood of an animal, instead of being utilized, were extremely toxic, a fact which at once argues against the absorption of the protein food in the form of peptones. Finally, if the peptones were absorbed in any considerable quantity from the intestine, we should expect to find them in the blood. Such is not the case, as investigators have been unable to find an increased peptone content of the blood of animals during protein digestion. Our knowl-

edge of the changes which proteins undergo during digestion was greatly increased in 1895 when Cohnheim discovered in the intestinal secretion erepsin, an enzyme which is very vigorous in its action on proteoses and peptones, splitting them into amino acids, etc. At present it is believed that during digestion of the proteins a profound and deep-seated breaking down occurs, so that finally the molecule is completely disrupted with the formation of such simple compounds as the amino acids and other allied substances. These are absorbed and somewhere in the body, maybe in the intestinal wall or in the liver, are again built up into proteins, but into a protein peculiar to the animal and not necessarily into a protein exactly like that taken in with the food. In other words the animal by digestion breaks up the protein molecule into small fragments and then puts these together or recasts them into a protein adapted to the peculiar needs of the particular animal. That each species of animal does have a particular kind of protein is evidenced by a fact first learned in the early attempts at blood transfusion from one animal to another. When the blood of one species was injected into the veins of another species, as for example, when dog's blood was injected into the veins of a cat, it was found that serious disturbances to the cat ensued. In other words the protein of dog's blood was foreign to the cat organism. This problem has been extend-

ed so that it seems very probable that one object, at least, of digestion, as far as proteins are concerned, is to break them down into their simplest fragments so that new proteins, peculiar to the animal, may be built up. Interest in this question is increased since we have been accustomed to attribute to plants alone this peculiar ability of building up or synthesizing complex organic compounds. Here we find among animals a similar process taking place, though to be sure, it is immediately preceded by a breaking down process. Other synthetical reactions are known to go on in the animal body, as, for instance, the formation of hippuric acid from benzoic acid and glycocol. The question now naturally arises: if in digestion the protein is thus broken up into such simple compounds before absorption takes place, would it not be possible to properly nourish an animal on proteins which had been digested outside the body until nothing but amino acids, etc., remained? Experiments of this kind have been tried, especially by Abderholden and his pupils, which seem to answer the question in the affirmative, so that now our knowledge of the changes taking place in the proteins during digestion seems to be rounding out towards completeness and meanwhile important facts as to the chemistry of proteins, both of plant and animal origin, are rapidly accumulating.



Today's Pioneers

"Hank"

Since the inhabitation of the earth by man, since the time when Cain went into the land of Nod to secure a wife, since the time when the Israelites journeyed into Egypt to find for themselves new homes and a betterment of conditions, has man continued to seek new fields where he might expand and provide for his successors a happier existence.

Scarcely had Columbus marked a path to the new world until an eager horde was ready to embark for the new land, eager to endure the hardships, to face the perils and dangers of a long voyage, eager to meet with savage tribes and wild lands in the hope that some day their successors would live to enjoy a happier and better existence in the strange land.

The Pilgrims, half starved and freezing, harrassed by disease and home dissention, hounded by Indians and wild beasts, held fast in the face of it all and firmly implanted in the new country that boot from which was to spring a great race. Their sons thrived and increased. The old world poured from out the clouds of conjested humanity a rain of human beings. The puddle of settlers was augmented; began to widen, to force back its barriers until no longer able to restrain itself, bursted forth in a mightly stream of immigration that was destined to people the new world from coast to coast. The stream bore away into the west, encompassing fertile tracts, flowing about the islands of barrenness, ever moving until the great Alleghanies were reached, then as



the obstacle presented itself the flood gathered in force and momentum and surged against the slopes until with a mighty wave it surmounted the obstruction and rushed away over the Western slopes into the broad and fertile expanses of the Middle West. And it has not stopped here, but fed from the ever-resourceful East, has advanced westward, crossed the Mississippi, crossed the Rockies, and reached its permanent limitations at the Pacific Coast.

These fields have furnished ground for the expansion of the tide until with-

are ranged horses and cattle, poultry and pigs, while in the ends of the car are stored the necessities of housekeeping and farm implements. Mingled with a trace of sadness of home leaving is written upon his face purpose and determination. He is leaving home and friends, comforts and pleasures, to take up the great task of building a home for himself and family in a strange and distant land.

Two weeks from this date, after a tiresome trip of jolts and knocks, our adventurer finds himself and belong-



Steam Plow Breaking Prairie Sod

in recent years when the current seems to be bearing away to the North, and the Canadian Northwest now is furnishing the new fields for development.

It now becomes our pleasure to trace for a spell the life of one of the atoms forming this tide. A freight train slowly draws its heavy string of cars from out a small town in Southern Ohio and as the cars pass us one by one we are finally attracted by a man standing in the door of a loaded car. Behind him

ings sidetracked in a small Western town. As he takes in the surroundings he is heard to mutter, "My God, is this where I am to stop?" He notes the wide streets with the low, square-fronted and unpainted buildings, the boardwalks, the lack of pavement, a scurrying team of bronchos drawing a rattling buckboard crosses his vision; then he turns to the business places, notes the hotel, large and crude, the imposing sign reading Saloon, the few

general stores, the bank where the Eastern capitalist does business in a room of 12 x 16 ft. dimension. Then the implement stores. Ah! yes these are symbols of the country's new industry, for piled high are the gang plows, the disc harrows, the seeders and binders, all destined to convert the prairies that stretches away on all sides like the swelling surge into fields of productivity and flowing grain. Then he perceives the two huge elevators under construction, the first of permanent buildings; they rise as monuments marking the departure of the Indian and buffalo, the rancher and his herds. They stand as signs of a new industry, the production of food to feed the world, the growing of wheat, wheat, wheat.

But our friend loses little time in these meditations and soon is busy in unloading the car. The tired and jaded stock are led away to the livery barn and household goods piled in a heap on the loading platform. A wagon is set up, loaded with stove, provisions, tent, some lumber and fuel and the few necessities of early camp life.

The break of day on the following morning finds him far out on the trail bound for his homestead land.

He sits high on the loaded wagon and with hat pushed back from brow drinks in the fresh morning air. The prairie which stretches away for miles on all sides is carpeted with blooming buffalo flowers and crocuses. The fresh new grass rises above the brown fallen blades of the past season's growth and is jeweled with sparkling dewdrops. In the distance he sees the retreating form of a coyote, and as the trail winds about a small lake he sees the wild ducks breakfasting or lazily stretching their wings in the morning sun. Further along he is startled by the rising of a

bunch or grouse as their swift wings give a great whirring noise. In a low glade to the North he sees two antelopes feeding and he passes by unheeded. Looking ahead he perceives a dark and blackened country and is filled with a wondering as to what this may mean, but as he gradually shortens the intervening distance he finds this to be the blackened earth where a ravaging prairie fire has swept all of nature's adornments away. And over this expanse he may see the bleached bones of buffaloes lying where the spoiler in his merciless sport laid them low, and a skull or femur bone lies at a distance where a wolf feasted in peace from the hungry pack that tore at the carcass. Then, too, here he sees wore deep into the sod the grass grouse paths, once the highways of the extinct herds.

As the day wears away our traveler meets with a settler townward bound, who walks by his team of moping oxen and ever urges them on with a long staff. They stop and pass the time of day and chat as to the whereabouts of each's destination, from what state or country they may have hailed, the prospects of the new country, distances, etc., and each goes on his way happier.

Towards evening our friend finds himself arrived at his own land; he selects a suitable place to camp and hastily rigs up quarters for the night. A great feeling of forlornness and weariness is upon him and when he thinks of the huge task ahead of him, the work of building a house and converting this expanse of tough virgin prairie into fields of loosened and life giving soil, he almost reels and wishes he would have remained in what he then terms God's country. But after a night of undisturbed rest he awakens full of new strength and courage. His first task is to build a temporary house and during



Stacking Timothy Hay

the next few days he works like one possessed. Many trips must be made to town, carpenters engaged, lumber hauled, household goods carted out, stables built, etc.

One morning a few weeks after his arrival he is overjoyed to see a new shack in the distance, then a few days later a tent springs up in the South, then several families come in from the East, until within two months he finds neighbors all about him and the prairie specked in all directions with the crude homes of newcomers.

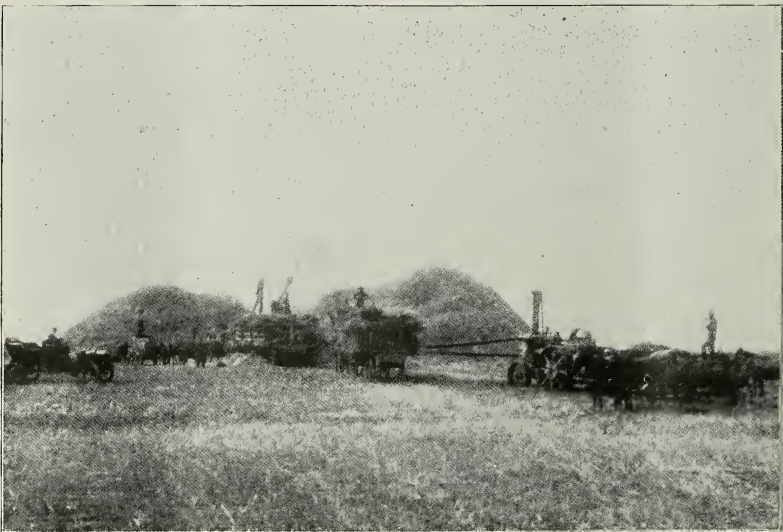
His temporary buildings completed, he turns his attention to the preparation of some land for the next season's crop. His family has now arrived and he begins to find happiness in his new surroundings. His good wife, at first home sick and sorrowful, longing for the sight of trees and the beautiful surroundings to which she had been accustomed, now begins to take pride in the humble home, and embodies the true pioneer spirit, that spirit which sacrifices self and present in the hopes of a future betterment of conditions.

The routine of daily life is broken occasionally by a barn dance or housewarming. Some new settler, wishing to further his acquaintance and to implant the warmth of life and mirth into the atmosphere of a new house, calls in the neighbors for miles around. The parties arrive in farm wagons, buckboards and democrats, horseback and even afoot. Families come from a distance of 25 miles. The lonesome young bachelor (as he is called), who is holding down a claim away to the West, comes in on his "brone" and brings with him his milk jug and basket, for these treats are rare and he carries with him home those luxuries of motherly construction, pies and cake that now so seldom find their way to his table. The music begins the fiddle and accordeon vibrate with familiar notes, the caller cries for two more couple, and the quadrille is on. While the young stalwarts and maidens engage themselves thus, the older folk find amusement at cards and gossip or at watching the pranks of the country comedian. Not until Old Sol sends his first rays dancing over the

prairie does the party think of going home, for there is always the happy excuse of losing the trail if the attempt should be made at going home before sunrise.

At the end of the first season our friend has a good block of ground ready for the seeder and in the following spring, probably in April, he is in the fields with harrow and drill. When the grain has taken root and begun to thrive the settler makes plans for further improvement of home and community. He begins the construction of a good, permanent house and possibly a barn, schools are installed and churches built. Roads are graded and bridges put in. Local government is installed and officers elected. The new railroad now is under construction and by another year our friend will no longer have to make the long 40-mile trips to

town, but will have a thriving young town within two miles of his farm. Throughout the whole community the sod shack and dugout is being replaced by good permanent buildings and the country has completely lost the air of desolation and God-forsakenness, and taken on that of thrift and progress. Trees have been planted and farms fenced, settlers rejoice in the productiveness of the land for the crops have been good and all indications point to a plentiful future. And when the season of the year approaches when the crops have all been harvested and the granaries are full, when old winter grips the land in an icy deadlock and when comes December with its joy and festivities, then as only a pioneer can to the people demonstrate the Christmas spirit and greet the new year with happy heart and new hope.



Threshing Wheat

Shorthorn Cattle

By Blacque F. Beck

The subject of Shorthorn cattle is one which without doubt, has been thoroughly discussed owing to the fact that they are a breed which satisfy the wants of the average farmer and are best suited to his conditions. That statement might be questioned to a certain degree, but let us see what the average farmer wants. He wants an animal that produces an ample supply of milk and is also a good beef producer. We have data to show today that the Shorthorn is producing, in some cases, amounts equal to and more than the distinct dairy breeds.

In the butter making contest for ninety days at the World's Columbian Exposition, at Chicago, in 1893, the Shorthorns won a close second prize to the Jersey breed and surpassed the Guernsey breed. It was also said of this test that the Shorthorns were not selected with the great pains and expense that the Jerseys were. At the Louisiana Purchase Exposition at St. Louis in 1904, the dairy test of Shorthorns yielded more satisfactory results than had any previous test of the breed. In a test of 120 days in which 20 Shorthorns were carried entirely through, the cows made an average of 4421.6 lbs. of milk, 165.3 lbs. of butter fat, and 3827 lbs. of solids not fat, an average gain in weight during the 114 days of 105.3 lbs. I have simply stated tests to show that the Shorthorn is not lacking in milk production and also in per cent. of butter fat. As a matter of fact the Shorthorn ranks very high from the dairy point of view.

The Shorthorn as a butcher's beast and beef producer ranks in the first class. We owe the excellent beef qual-

ities of this breed to the famous Mr. Cruickshank, who gave this feature special distinction and by his careful selection finally produced an animal that excelled other breeds in beef production.

The quality of this breed ranks higher than any other. The Shorthorn is an excellent feeder, has an even temperament and does not exert extra energy unnecessarily. If a man intends to build up a herd of cattle, he is often at a loss to know just what course to pursue to obtain the best results. As we are discussing this feature from the standpoint of the average farmer, he in most cases will desire a grade herd owing to the expense of securing pure-bred animals. The first step is to purchase a good pure-bred sire, because one-half and a great many times more than one-half of the quality of a herd depends upon the sire. Then purchase the very best grade cows you can find. By mating the pure-bred sire with a high grade cow you will usually secure a good grade animal.

There is a strong tendency to breed animals too young when building up a herd. Never do that, because right at that point you hinder the development of the animal and cannot expect satisfactory results from either the animal or its off-spring. Always assort your animals very carefully and keep the best females. A great many of the farmers sell the best females and breed the inferior ones. There is a strong tendency to do this because the good ones are selling for the top prices, but if you keep the best females, in a remarkably short period of time you will have a good herd that will give you good results for the future. Some noted stock-

man has said, "Selection has had more to do with the successful breeding of live-stock than any other factor" and when we consider that fact fully we find it very true.

Let us now pass on to the subject of feeding these animals. Usually an average farmer cannot afford to expend a very great amount for feed, and he can secure feed that he raises at much less expense and it has been shown that just as satisfactory results have been secured. The feeding of any class of stock is a rather simple problem during the summer months, but the feeding of stock in winter is a more difficult problem. In the summer if the Shorthorn is given a wide range of pasture and good water facilities, very satisfactory results are obtained and the pasture that the animal consumes costs a very small amount. I know this ration is a very common one, but blue-grass is very milk-productive, appetizing and fattening. The same is true of clover pasture. Beets, cabbage, and such vegetables aid the digestion of the animal greatly, and should be fed from time to time during the summer.

Now let us consider briefly the winter ration. I think alfalfa should be considered first, because if an ample amount of this is fed you need not feed

so much grain. Clover, alfalfa, and timothy are all good grass feeds. Timothy is the poorest of the grasses. Beets and vegetables of different varieties could also be fed very consistently through the winter. Clover hay is very milk-productive. Ensilage, cotton-seed meal, linseed meal and different kinds of ground grains are all desirable rations. The average farmer cannot have all of these feeds, but use good common sense and feed consistently and above all things give your cattle plenty of exercise throughout the winter because you are wasting at least one-fourth of your feed if your cattle lack exercise.

Another important phase of this work is sanitation. If you intend to sell dairy products, beef cattle or whatever course you intend to pursue with your cattle, sanitary environment means one-half of your profits.

Now I have discussed Shorthorn cattle from the standpoint of the average farmer and would present a much different discussion from the standpoint of the pure-bred cattle owner, because he has in view the show-ring and salable pure-bred animals while the average farmer with a grade herd depends almost entirely upon the dairy and beef production.

Capitalistic Farming

By C. B. Durham, '13

Agriculture now requires a volume of capital and a degree of scientific intelligence which comparatively few of the old generation of extensive farmers are prepared to supply. A newer generation is growing up. The country as a whole is advancing, and no phase of industry at the present time seems to

offer greater reward for well directed endeavor and capital than agriculture. Through frequent, but by no means none too frequent admonitions by those high in agricultural authority, we as a nation are coming to feel the need for conversation of resources, and to realize the dangers of the old hit or miss

methods of tillage. If the agriculture represented by the almost criminal methods of the soil-exhausting farmer of the West has come to the point of digging its own grave, ultimate betterment of existing conditions may result.

But the new systems of culture, the general attention which we gladly admit agriculture is receiving, the era of perfectly scientific farming—these things, though good, are not without their hazards. The new agriculture is just beginning to receive the attention of men controlling great capital, and the economic status of the time almost universally illustrates the dominance of capital over labor. The often boasted independence of the American farmer may become subject to the same danger of the small manufacturer—that of being swallowed up by a great trust.

There may arise in a few decades great captains of particular phases of farming, just as there are today great captains of industry controlling an oil monopoly or a steel trust. It is not at all impossible that in a few decades the young graduate of an agricultural college may become a machine in a great farming corporation just as the young engineer who today enters the employ of a great railroad or steel corporation.

The state of affairs just suggested may seem visionary, but economic conditions point to a great change in farming methods. This change is tending toward the employment of greater capital in farming than has heretofore been known. Already there are capitalists organizing farming companies on the corporation plan. These companies pay

dividends to their stockholders, increase their capital stock, and they are growing in much the same manner that our well known trusts have grown. For a concrete instance, there is today in Montana a series of companies formed and controlled by one man, Mr. Lewis Penwell. These companies reaped last year a profit of seventeen per cent. upon an investment of about one million dollars. These companies are engaged chiefly in the sheep industry, although in one or two instances areas have been devoted to general farming to the profit of the company.

The operations of such a company is changing conditions in Montana, and home seekers in that state have been forced to employ capitalistic methods, or to seek elsewhere for profit from farming. This instance shows how in one section a corporation may control to a striking degree farming conditions, and, what is more important, it suggests what may take place in future generations.

Another company recently organized in a western state now controls more than 250 square miles of grazing territory.

These paragraphs suggest in brief a line of thought well worth the consideration of students of agriculture. Is capitalistic farming destroying the dependent family? Can the state or nation afford to permit the very cornerstone of its citizenship to be undermined by the elimination of the farm homestead? The anchorage of political stability is still in our rural population, and it will be a bad day when rural families cease to be perpetuated under their own vine and fig trees.

Fruit Growing on the Western Slopes of Colorado

By Harry L. Peck

The growing of fruit by irrigation has been practiced in Colorado almost since the time the first settlements were made, but the last five years has seen a greater development of the industry than the entire period up to that time.

At present the western fruit growing section of Colorado comprises a belt stretching from Montrose on the South to Grand Junction, Palisades and Fruita on the North, a distance of possibly a hundred miles.

The early growers had a pretty hard time of it and it was not until they learned the value of co-operation both in harvesting and marketing their crops that they have had a great degree of success.

At the present time good orchard land with bearing orchard is worth anywhere from \$500 to \$2000 per acre. These values may seem fictitious, but the good growers in favored localities are making big interest on their money at the highest valuation.

But while that country has the advantage over the East in having more sunshine and a more fertile soil, these advantages it seems to me are more than balanced by the absence of good drinking water and the utter lack of good shade trees other than a few cottonwood. And the fact that the grower has to irrigate, and wage a constant warfare against Russian thistles, which seem to grow at the rate of three or four inches a day, and then at night fight more Russian thistles in his dreams, would certainly incline one to the growing of fruit in the effete East.

The Colorado grower has tried numerous systems of planting and many

of the older orchards are planted by alternating rows and by alternating trees of apples, peaches and pears. This method is falling into disuse, however, as the average grower will invariably leave his peaches in until he has spoiled the shape of his apple trees. The more general practice now is to plant apples 30x30 feet, 30x32 feet and 35x35 feet, according to the variety planted. Peaches, pears and plums are generally planted 20x20 feet. Yearling trees are most commonly planted so they can be headed low, decreasing the cost of pruning, spraying and harvesting.

Many of the older growers attempted to raise small grain crops in their orchards while they were coming to bearing, but this practice was found to be unprofitable because it robbed the young trees of a great deal of plant food and moisture, and after the grain crop was harvested the grasshoppers and other insects which were in the grain immediately transferred their affections to the foliage of the fruit trees, stunting and destroying a great many in every orchard where the practice was followed.

Around Grand Junction many of the smaller orchardists plant sugar beets between the tree rows. Where sugar beets are raised entirely 15 to 20 tons are considered a good average, and at five dollars hauled to the factory it makes a good income. Where the beets are raised in the orchard, for the first two or three years, one-third to one-half this sum can be counted on. Around Montrose and other districts which have no sugar factory, potatoes are often grown as an orchard crop.

There are several varieties of apples grown. Among these are the Gano, Grimes Golden, Pearmain, Winesap and Ben Davis, but according to Mr. Mendenhall, a prominent grower near Montrose, the Jonathan is the most profitable because of its rich color and excellent quality, and it seems to be the most common Colorado apple on the Columbus market.

It is the general practice of many orchardists to prune in the Spring and Summer, but as most of the fruit has a tendency to overbear, it might be a good practice to do a little more fall pruning, especially for apples.

All western fruit lands require more or less irrigation and the average grower likes to get water on his land at least five times during the season, and if he is under a good ditch he generally does better than that. There is some danger from over-irrigation, however, but the general rule followed by most growers is to irrigate whenever they can get the water.

I remember seeing a piece of twenty acres set out to yearling apple trees which had only had water on twice that season and still the trees seemed to be in good condition, chiefly because of careful cultivation, which had formed a dust mulch, conserving whatever moisture there was in the soil.

Smudging has been practiced in the fruit sections for several years, but no general apparatus was used and the grower relied more upon the smoke for frost protection than upon the heat. But after two very severe frosts which destroyed nearly all the fruit, the growers began experimenting with smudge pats.

There are two or three types of oil and coal pats which seem to give the best satisfaction out of more than a hundred which were tried out. The

writer saw an experiment with coal smudges where the temperature of an orchard was raised ten to fifteen degrees inside of an hour. Frost alarms have been invented and have been proven very successful all over the West in warning the orchardists when the temperature has fallen low enough so that it is necessary to start the smudge pats.

The western grower found out early that in order to produce any fruit at all he had to spray his trees, because the coddling moth causes him more trouble than it does the eastern farmer, although it is destructive enough here. But the Westerner has less trouble from scab than we do, so that arsenate of lead has been his chief spraying material, and although the Experiment Station in Colorado only recommends three sprayings, many growers have sprayed as often as five or six times during the season, and these are the people who during the last two or three years have lost a large number of trees from arsenical poisoning. Here in the East we lose most of ours from San Jose scale. So in certain localities where the soil is highly alkaline and where they have sprayed so heavily, the growers became seriously alarmed over their losses and called upon the Experiment Station at Fort Collins for assistance in battling with this new trouble, and the scientists at the Station have discovered a new spray material which so far has proven very successful, as it is entirely insoluble and so is suitable to their conditions.

In order to produce fancy fruit the growers found that they grew a much better article where they thinned the fruit out considerably. Some of the higher class apples are thinned to eight to ten boxes to a tree pretty well matured and these will run as high as 95

per cent. perfect or fancy when well cared for. Heavily bearing older trees, which run over ten boxes after trimming, generally require two pickings.

In harvesting his fruit the grower uses great care in picking and grading, and the apples are packed uniformly in bushel boxes which run from 150 to 160 apples to the pack. And where the fruit is sold by fruit growers' associations the buyers are guaranteed that all fruit is in perfect condition.

Whatever success the western fruit grower has had is not due to any greater amount of intelligence upon his part, but simply because of his environment, distance from markets, etc., he has had to adopt newer methods in order to exist, and he has learned thoroughly the lesson which the eastern grower may well follow. That is specialization in growing and co-operation in marketing his crops.

The Department of Forestry

By Prof. W. R. Lazenby

For many years past the State University has given some instruction and more or less training in Forestry and for a shorter time has had a combined course in "Horticulture and Forestry."

The growing tendency to specialize more and more in the various pursuits and professions of life, has made this combined course unsatisfactory. Neither the student in horticulture, or he who wished to specialize in forestry was getting as completely or thorough instruction as he desired or deserved. To correct this a new course in forestry has been established. It is a four-year course leading to the degree of Bachelor of Science in Forestry.

Although this course leads to a technical degree in a special field, it is based on lines broad enough to afford a good, general, scientific education.

ARRANGEMENT OF COURSE.

There has been much discussion of late as to the best arrangement of the various subjects that are the proper studies of a technical course. From a pedagogic standpoint it goes without saying that the preliminary or fundamental studies should precede; that is,

the sciences and general art subjects upon which the successful practice of a profession is based should come first, which the applications and technique should follow. There is, however, a growing tendency to introduce more of the practical subject into the first two years of the course. This is considered advisable in order to interest and hold the student. When a student enters a course like "Engineering," or "Agriculture" or "Forestry," he is naturally impatient to begin in the so-called "practical" or technical work of the course. He does not fully realize the importance of a good foundation. He does not clearly see how chemistry, physics, botany, the higher mathematics, a better knowledge of English, and some one or more of four modern languages, to say nothing of entomology, bacteriology, meteorology, etc., are of vital importance.

And yet unless he is thoroughly grounded in the principles of these and other subjects he is not prepared to attain real proficiency in his chosen profession. The fact is, these subjects constitute not only the foundation, but the frame-work, the very body and bones

of a sound and thorough technical education.

WHAT FORESTRY MEANS.

Forestry is an art, and the successful practice of a new art like Forestry, is largely based upon a full command of science. Forestry means in the production of wood crops what agriculture means in the production of food crops. Until very recently in this country, the production of our wood crop has been left to nature, but we are beginning to recognize that intelligent direction and practical skill are just as necessary to produce satisfactory or remunerative wood crops as they are to produce satisfactory food crops. The aim of the University in establishing this new department is to educate and train young men in the art of forestry and to promote forest tree culture and management in the State of Ohio. The importance of forests as sources of wood and timber, the relation of the forest cover to soil, and to water supply, are becoming better understood every day, and the demand for well trained men in forestry is growing rapidly. One hundred and sixty-eight million acres of forest lands are now owned by the people of the United States.

The organization and proper administration of these great national forests furnish unusual opportunities for well trained men. There is an increasing demand by railroads, lumber companies and the owners of large landed estates for graduates of forest schools.

If one has money to invest, as well as training of the right kind, there are splendid opportunities for one to go into a business of his own along some line of forestry.

OPPORTUNITY FOR FIELD WORK.

While the facilities for pursuing the fundamental and accessory studies are amply provided for, it may be thought that Ohio, or the vicinity of Columbus, at least, does not offer the best of opportunities for field work in forestry. Excepting the pine forests that are practically wanting in this State, Central Ohio furnishes quite as good advantages as can be found elsewhere. Our numerous and convenient inter-urban car systems will take the student at very moderate cost, to a great variety of hardwood and swamp woodlands in all conditions, from the virgin forest to the closely culled and cut-off timberland.

Here the results of good, bad and indifferent methods of management can be seen and the effects studied.

ADVICE TO PROSPECTIVE STUDENTS

"Would you advise a course in forestry for my son?" is the question often asked.

My answer is somewhat as follows: If your son has a natural love for trees, enjoys an outdoor life, has a taste for adventure, and can endure physical hardship, by all means let him fit himself for the profession of forestry. It is a healthful, useful and fairly well paid profession. Its practice, however, usually precludes the excitement and social conveniences of the town and city. One would better not enter upon the vocation of a forester unless he is willing to live close to nature and take his chances with her varying moods. Another fact should not be overlooked. Even a "four-year course" cannot make an expert, or fully fledged forester. Mastership in any vocation comes only with long experience. Theoretical training alone does not give mastership.

THE AGRICULTURAL STUDENT

A MONTHLY MAGAZINE DEVOTED TO THE
INTERESTS OF FARMING, STOCK-RAISING,
DAIRYING AND CREAMERY WORK

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COLUMBUS, O., JANUARY 15, 1910.

Editorial

Prof. W. J. Spillman points out the fact that farm boys have furnished this country with 92 per cent. of its presidents, 91.2 per cent. of its governors, 83.9 per cent. of its cabinet officers, 70.6 per cent. of its senators, 64 per cent. of its congressmen and 55.4 per cent. of its railroad president. This is a record of which farmers should be proud. But at the same time it might be well to ask whether such a showing can be made in the future. Are the farm boys of today as self-reliant, as industrious, as

well trained in morality and as free from influences which prevent success as were those of preceding generations?

No attempt is made to answer this question; only a few notes gleaned from observation of the younger generation on the farm and in the Agricultural Colleges being jotted down in the passing. Very few of the young farmers ever attend the Agricultural College, but those that do are noted for their self-reliance, industry and morality. Many are thrown upon their own resources and are making their expenses at the same time they are getting their education. They have a high standing for industry and diligence. Being used to hard work on the farm, they little fear the exertion, sometimes painful, necessary to acquire an education. These are the boys, though not the only ones, that are hitching their carts to a star. There are also boys on the farm, who, not having the advantages of a college education, nevertheless, by hard work, study and perseverance, are making their presence felt and will some day be an important factor in our Government. It is our belief that there is just as large a per cent. of self-reliant, industrious, honest farm boys today as in the days gone by. Then most every one was a farmer. Now, there are other fields from which our presidents, governors, congressmen, etc., may be chosen. And because the per cent. is not as high as then, we must not hastily conclude that the farm boys are degenerating.

We are greatly pleased by the way the students responded to the call for money to purchase a cup for the Poultry Show. It is in this way that we make the public feel that we are interested and appreciate what they are doing for us and the University.

The two weeks from Jan. 3 to Jan. 15 have been very busy and instructive to the Agricultural students and to stockmen and farmers in Ohio generally. There have been among other things the meeting of the stockmen and the different breeding associations, the Dairymen's Association, the Farmers' Institute, the Corn and Apple show, the Horticultural Meeting, the Poultry Show and many other meetings of less interest to the general farmer. Although these have been attended to a certain extent by the students of the Agricultural College, we are indeed sorry that there were not more of them present to hear the many talks given by men who are of National reputation in their lines. It would seem that the students of agriculture would be more interested in their chosen profession than they have shown at the recent meetings. It is recognized by the faculty that the meetings were of great importance and they made arrangements to excuse men from classes to attend, but only a few took advantage to attend.

One of the most interesting and enjoyable speeches was made by Pres. Thompson on Jan. 13 before the meeting of the State Board of Agriculture on "The Conservation and Development of Ohio's Resources." Gov. Harmon's address before the same body was also very good and he pointed out what a large per cent. of our expenditures went for war purposes and what a small per cent. were spent for agriculture and education.

As the General Assembly is in session our thoughts naturally turn toward the pressing need for more funds for the College of Agriculture. We certainly need more buildings and equip-

ment to accommodate our students. We especially need more and better equipment in the Animal Husbandry Department, as there is not near enough money appropriated to support it as the Animal Husbandry Department of Ohio should be supported. One of the prominent Shorthorn breeders of Ohio was heard to say not long ago that it was a shame that the State of Ohio would not furnish the money to the College of Agriculture, like Illinois, Iowa, and several other states, which are no richer than our State. We can see no better way of increasing the resources of this State than by the education of our farmers, as Agriculture is by far the most important industry. When we learn to grow more and better live stock and farm products the Legislature will not have to appoint committees to investigate the high cost of living. The high price of meats is caused because there is a scarcity of live stock in the country, owing to the settlement of the great western ranges. The live stock must be raised in the states of the Middle West and Ohio is one of them. So let us spend less money for other things and more for agricultural education.

The "Student" wishes to extend a hearty greeting to the Winter Course students and congratulate them on being here. There is always a large class of farmers who are unable through various causes to take the regular course in Agriculture and a great many of these are accommodated by this course. We know that you will have a profitable and enjoyable term and hope that we may become better acquainted and that you may see fit to ask us that your name may be put on our mailing list.



NEWS NOTES



Meetings of the Dairy Association

The sixteenth annual convention of the Ohio State Dairymen's Association was held at the University, January 5, 6 and 7. The sessions were held in the Main Building and Townshend Hall.

The address of welcome was delivered by President W. O. Thompson, speaking for the University.

Dr. Thompson's address was followed by one from Mr. J. D. Nichols, president of the Association. Mr. Nichols emphasized the profit in dairying, the need for education and practical methods, and the urgency of a fight on tuberculosis in cattle by proper sanitation and every other method.

Dr. A. S. Cooley, city veterinarian of Cleveland, spoke on the subject, "The Veterinarian versus the Dairyman." He brought out the fact that the veterinarian and dairymen should work together in the interests of more healthful dairy herds and therefore more sanitary milk.

Mr. W. W. Marple, of Muncie, Ind., gave an address on "The Future Dairymen."

Other interesting subjects discussed were: "Dairy Sanitation," by Mr. George E. Scott, State Dairy and Creamery Inspector; "Dairy Legislation," by Renick W. Dunlap, State Dairy and Food Commissioner "Fundamental Principles in Sanitary Milk Production," by Prof. W. A. Stocking, Cornell University, and "Butter versus Butterine," by Prof. Alfred Vivian, of Ohio State University.

Especially interesting was the lecture by Mr. Stephen Francisco, of Mont-

clair, N. J., the first producer of "Certified Milk." He started in twenty-one years ago with a small farm and thirteen cows and now has 700 acres and a daily product of 6500 quarts of milk. He was the first dairymen in the country to deliver his milk in bottles filled at the dairy. His dairy maintains a laboratory with two nurses to prepare milk especially for infants.

Two interesting lectures were given by W. J. Gillette, of Rosendale, Wisconsin, one of them being on "How a Cow was Handled and Fed to Produce 1000 Pounds of Butter Fat in One Year."

An interesting exhibit of market milk and cream and dairy machinery was held in Townshend Hall in connection with the convention.

Mr. A. S. Neale, of Macedonia, an O. S. U. graduate, was elected president of the Association for the coming year.

On the evening of Jan. 4th the State Live Stock Association held its annual banquet at the Busy Bee, with a large attendance of stockmen. Among those who spoke were: Dr. Thompson, Prof. Plumb, Dan Black, Col. Perry, O. E. Bradfute, Mr. Wilbur and Jas. B. McLaughlin. John B. Cunningham, of the Ohio Farmer, acted as toastmaster. Although the students of the Agricultural College were invited to attend, only the representatives of The Student were present. It was certainly a very profitable meeting and should be well attended by the students, as it is there that they can come in personal contact with the foremost breeders and feeders of the state.

N. E. Shaw, '06, State Orchard and Nursery Inspector, read a paper, "The Increasing Demand for Orchard Inspection," before the American Association for Advancement of Science, held in Boston during the holidays.

F. N. Fagan attended the meetings of the American Association for the Advancement of Science, held at Boston the week after Xmas.

Ed. Kinney, '08, former business manager of The Agricultural Student, now located in the Agricultural Experiment Station of Kentucky, paid us a visit during the holidays.

E. O. Williams, '08, located at Colorado Experiment Station, visited the University and friends during the vacation.

J. H. Gourley, '08, of the Ohio Experiment Station, is in Columbus in connection with the apple show which is being held in the Lazarus block.

Emmet Hoddy, '09, who is doing Government work in Entomology in California, was a visitor in the city during the holidays.

H. E. Allen, '09, stopped off in Columbus a few days on his way home from Virginia Tech., where he is Assistant in Animal Husbandry.

The American Association of Science at Boston, Mass., during the holidays, was well attended by Ohio State. F. N. Fagan, Phil Lugenbill, Prof. Osborn, Prof. Lazenby, Prof. McPherson, Prof. Landacre and Prof. Griggs were present at the meeting. The meeting was a

very profitable one and was enjoyed by all who attended.

E. C. Cotton, located with the Tennessee Agricultural Experiment Station, read a paper, "A Constant Low Temperature Apparatus for Biological Investigation," before the American Association of Economic Entomology at Boston. This is a new line of investigation and his paper was well received.

W. S. O'Kane, of the New Hampshire Agricultural College, read a paper on the work of the apple maggot done at that station.

Agricultural Educational Trains in Ohio

Arrangements have been completed with the Baltimore & Ohio, Baltimore & Ohio Southwestern, and the Norfolk & Western to run educational trains during the month of January under the auspices of the College of Agriculture of the Ohio State University. The B. & O. train is to start at Bellaire and run to Newark and from Newark to Marietta. The dates of this train will be January 18, 19 and 20. The B. & O. S. W. will continue the train from Marietta to Portsmouth on January 21 and 22. The Norfolk & Western will run their train from Portsmouth to Cincinnati on January 24, 25 and 26.

The entire distance covered by these three roads will be about five hundred miles. Lectures will be given on fruit growing, dairying, and live stock by representatives of the College of Agriculture, the Ohio Agricultural Experiment Station, and the State Board of Agriculture. Exhibition cars will be carried on the trains and stops will be made from one to two hours at the differently stations. A schedule of the stops will be thoroughly advertised along the line of the trains.

Special Four O'clock Lectures Before Students in the Win- ter Course in Agriculture

All lectures will be held in Room 200, Chemistry Building. The lectures are open to the public and visitors are welcome. Farmers who come to attend these lectures are invited to spend the entire day at the University and to attend the regular class lectures before the Winter Course students. The lectures are as follows:

Jan. 10.—Opening Address, H. C. Price, Columbus, Ohio, Dean, College of Agriculture, Ohio State University.

Jan. 11.—W. O. Thompson, Columbus, Ohio, President, Ohio State University.

Jan. 12.—Meetings of Allied State Agricultural Associations. (No lecture.)

Jan. 13.—Meetings of Allied State Agricultural Associations. (No lecture.)

Jan. 14.—Meetings of Allied State Agricultural Associations. (No lecture.)

Jan. 17.—John F. Cunningham, Cleveland, O., Editor Ohio Farmer, "Community Interests."

Jan. 18.—John F. Cunningham, "Advertising From the Farmer's Standpoint."

Jan. 19.—J. J. Crumley, Wooster, O., Assistant in Forestry, Ohio Agricultural Experiment Station, "Making Use of Waste Places on the Farm."

Jan. 20.—J. J. Crumley, "Relative Durability of Post Timbers."

Jan. 21.—J. J. Crumley, "The Condition of Ohio Forests and Suggestions for Their Improvement."

Jan. 24.—J. F. Keller, Newark, O., Potato Farmer, "Potato Growing."

Jan. 25.—J. K. Keller, "Potato Growing."

Jan. 26.—Open date.

Jan. 27.—Open date.

Jan. 28.—Open date.

Jan. 31.—E. R. Root, Medina, O., Editor Gleanings in Bee Culture, "Bee-Keeping as a Profession."

Feb. 1.—E. R. Root, "Handling and Management of Bees."

Feb. 2.—E. R. Root, "Bees and Horticulture" (illustrated).

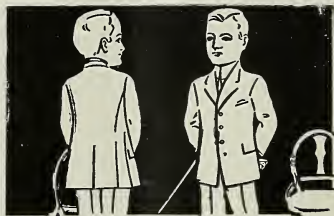
Feb. 2.—A. P. Sandles, Columbus, O., Secretary State Board of Agriculture, "Mixing Brains with Toil and Sweat."

Feb. 4.—C. B. Galbraith, Columbus, O., State Librarian, "Library Problems in Ohio."

Feb. 7.—J. Warren Smith, St. Louis, Mo., District Forecaster, U. S. Weather Bureau, "Methods of Protecting Crops from Frost."

Feb. 8.—J. Warren Smith, "Lightning Rods."

Feb. 9.—J. Warren Smith, "The Work of the U. S. Weather Bureau" (illustrated).



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Feb. 10—E. A. Dunbar, Ashtabula, O., ex-President Greenhouse Vegetable Growers' and Market Gardeners' Association of America, "Greenhouse Construction."

Feb. 11—E. A. Dunbar, "Growing Vegetables Under Glass."

Feb. 14—Joseph E. Wing, Mechanicsburg, O., Associate Editor Breeders' Gazette, "The Function of Carbonate of Lime in the Soil."

Feb. 15—Joseph E. Wing, "Alfalfa Farming."

Feb. 16—Joseph E. Wing, "Meadows and Pastures."

Feb. 17—Joseph E. Wing, "Sheep Farming in Ohio."

Feb. 18—Joseph E. Wing, "Farming in the Old World."

Feb. 21—R. W. Dunlap, Columbus, O., Dairy and Food Commissioner of Ohio, "How the Food Laws Affect the Farmer."

Feb. 22—Washington's Birthday. (No lecture.)

Feb. 23—A. R. Pickett, Clyde, O., Nurseryman and Fruit Grower, "The Growing and Handling of Nursery Stock."

Feb. 24—A. R. Pickett, "Ohio Orchards."

Feb. 25—W. A. Alsdorf, Johnstown, O., Member of the Ohio State Senate, "Taxation of the Farmer."

Feb. 25—C. G. Williams, Wooster, O., Agronomist Ohio Agricultural Experiment Station, "Studies of the Relation of Prominent Ear Characters in Corn to Yield."

March 1—C. G. Williams, "Improving the Corn Crop of Ohio."

March 2—C. G. Williams, "Alfalfa Experiments."

March 3—C. G. Williams, "Wheat Experiments."

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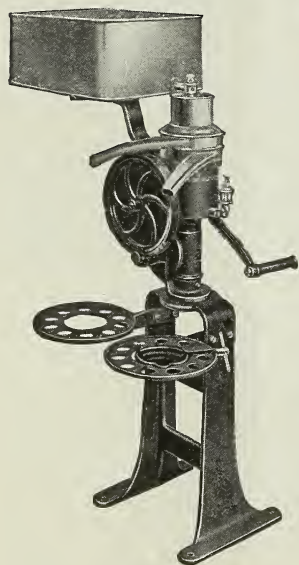
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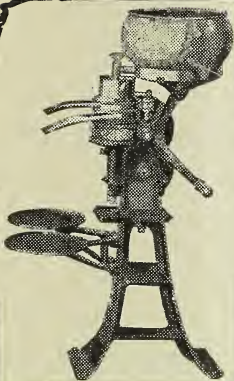
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